Remarks

The following remarks are provided in further support of the ~~Claims~~ Claims.

Present Status of the Claims: Claims **1-21** are pending in the application. Claims **1-10, 12,** and **13** are rejected. Claims **11** and **14-21** are objected to.

Objections:

An objection is raised to the absence of the section "BRIEF SUMMARY OF THE INVENTION, which is recommended in 37 CFR 1.77(b).

Claim 17 is objected to because if a collimated light beam is selected according to its parent claim, Claim 2, then the Office asserts that it contradicts with the un-collimated light beam of Claim 17.

Claims 18-21 are objected to because they are dependent on an objected parent claim, Claim 17.

Allowable subject matter:

Claims 11, 14-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, or if the rejection to its parent claim can be overcome.

Rejections:

Rejection Under 35 U.S.C. §103(a)

Claims 1-3, 6-9, and 12-13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zaromb (US Pat No. 3,768,908) in view of applicant's admitted prior art.

Claims 4 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zaromb ('908) in view of Ulich (US Pat No. 4,862,257).

Claim 10 is rejected as being unpatentable over Zaromb ('908) in view of Ramstack (US Pat No. 6,396,577).

I. DISCUSSION - OBJECTION TO SPECIFICATION

An objection is raised to the absence of the section "BRIEF SUMMARY OF THE INVENTION, which is recommended in 37 CFR 1.77(b). However, 37 CFR 1.77(b) contains a list of recommended sections and an order in which they should occur if included. Inclusion of the sections is recommended but not required. The required components of a non-provisional application are enumerated in 35 U.S.C. §112. Therein it states that the specification shall contain a written description of the invention that enables a person skilled in the art to practice the invention, a best mode, and one or more claims. Since all these required components are present in the application as originally submitted, a summary of the invention is not required and the applicant chooses not to amend the specification to include one.

II. DISCUSSION - 35 U.S.C. §103(a)

Claim 1 is rejected under 35 U.S.C. §103(a) as unpatentable over Zaromb (US Pat. no. 3,768,908) in view of applicants' admitted prior art. The Office asserts that Zaromb teaches a method comprising interacting a pulse of transmitted light with a mobile agent and using the intensity of the interacted light for mapping the movement and position of a mobile agent (such as a pollutant) with a stand-off optical detection for monitoring the position of a mobile agent so that the location of the mobile agent can be determined at any desired time for mapping purposes.

The Office asserts that Zaromb '908 teaches a method comprising transmitting a pulse of light at a first known time, interacting said pulse of transmitted light with a mobile agent to generate a pulse of interacted light, receiving said pulse of interacted

light with a receiver optical system at an at least one later known time, measuring an intensity of said pulse of interacted light with at least one photodetection system in a manner suitable for electronic data storage, storing the intensity measurements as data, repeating the interacting, receiving, measuring, and storing a plurality of times for mapping the movement and position of a mobile agent (such as a pollutant) with stand-off optical detection for monitoring the position of a mobile agent so that the location of the mobile agent can be determined at any desired time for mapping purposes. The Office further states that Zaromb does not teach a method of comparing stored intensity data using a change detection algorithm for monitoring the position of a mobile agent so that the location of the mobile agent can be determined and mapped. The Office further asserts that comparing stored data by means of change detection algorithm to map a location of an object in time and space is admitted prior art for monitoring a change in the position of a mobile agent so that the location of the mobile agent can be determined for mapping. The Office more specifically asserts that col. 4 lines 4-12 of Zaromb teach the interacting of a pulse of transmitted light with a mobile agent to generate a pulse of interacted light and that col. 4 lines 8 and 10 teach the mapping or tracking of the movement and position of a mobile agent for monitoring the position of the mobile agent so that the location of the mobile agent can be determined at any desired time for mapping purposes.

However, the teaching of Zaromb combined with a change detection algorithm does not teach the present invention nor does it make the present invention obvious. The patent of Zaromb is directed to the detection of the presence and, if possible, the concentration of pollutant gases along an optical path of an optical detection system by measuring the intensity at several wavelengths (independent claims 1, 10, and 14). It does not teach the measuring of the time delay or time interval between the transmitting of the transmitted pulse and the receiving of the interacted light at the detector for the purpose of determining the distance to a mobile agent with which the transmitted pulse light has interacted. In the present invention, the intensity of the interacted light is measured as a function of time to determine the distance to the mobile agent since it will take longer for interacted light coming from a more distant object to reach the detection system. This aspect of the invention related to the time-dependence of the

measurements is explained, for example, in the discussion of the embodiments; see especially the descriptions in paragraphs 17, 18, 21, 33, and others. We have amended **claim 1** to clarify this distinction.

The method of Zaromb '908 also does not teach or describe the tracking of the location of a mobile agent that is moving within the field of view of an optical detection system using changes in the time interval between the transmitted pulse and the receipt of the interacted light pulse at the detector. In Zaromb '908, tracking or mapping of a pollutant (not of a mobile agent) requires physically moving the optical system to change its field of view. Column 4, lines 4-25 of Zaromb discuss the method whereby the invention of Zaromb may be used to "track" or "map" the distribution of pollutants. In each case, the apparatus is moved to change its field of view to permit optical sampling of a different location; the tracking or mapping of Zaromb does not employ the time-dependence of the return of an optical signal to an optical detection system along an optical path that has not been deliberately changed between the time of the transmitted pulse and the receipt of the interacted light pulse.

In contrast, the method of this present invention uses an optical detection system to generate the multi-dimensional (3-D or 4-D) map of agent location by time-dependent detection of interacted light. The time at which the interacted light reaches the detection system relative to the time of the initial laser pulse is a function of the distance between the detection system and the agent interacting with the light. By regulated or continuous scanning over a specified space for a specified time period, a 3-D or 4-D map can be obtained (see, for example, paragraph 17 of the present application).

Additionally, Zaromb describes his invention in column 1 lines 5-7 as an optical means of detecting air pollutants; he does not teach or suggest the measurement of mobile agents using his invention. In paragraph 14 of this present invention of Schmitt et al., the mobile agents whose movements are characterized using embodiments of this invention are described as living organisms or non-living, man-made units, not chemical gas pollutants.

Since Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents

using the time dependence of the interacted light returning from the mobile agents, combing the teaching of Zaromb with a change-detection algorithm does not render Claim 1 obvious.

Claim 2 is rejected for the same reasons as Claim 1 and because Zaromb teaches the use of laser pulse transmission (col. 1, lines 32-36 and 56-57) and laser is a beam of collimated light, and that collimated light is light whose rays are parallel.

As presented above for Claim 1, we have shown that Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Therefore, it does not render Claim 1 obvious alone or in combination with other art. Since Claim 2 is rejected for the same reasons as Claim 1, Claim 2 also is not rendered obvious by Zaromb alone or in combination with other art. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make all claims formerly dependent upon Claim 2 to now be dependent on Claim 1.

Claim 3 is rejected for the same reasons as Claim 2 and because Zaromb teaches that receiving is performed using a receiver optical system comprising a receiver telescope (col. 2 lines 38 and 48-50) and at least one optical band-pass filter (col. 2 lines 36-53) suitable for passing light that has interacted with the mobile agent and wherein the photodetection system comprises at least one photodetector with gain and at least one digitizer to record (col. 3, lines 56-67 and specifically lines 64-67) the intensity (col. 10, lines 18-23) of the interacted light.

As presented above for Claim 2, we have shown that Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Therefore, it does not render Claim 1 obvious alone or in combination with other art. Since Claim 2 is rejected for the same reasons as Claim 1, Claim 2 also is not rendered obvious by Zaromb alone or in combination with other art. Since Claim 3 is rejected for the same reasons as Claim 2,

Claim 3 also is not rendered obvious by Zaromb alone or in combination with other art. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claim 3 to now be dependent on Claim 1, which Zaromb does not render obvious alone or in combination with other art related to change-detection algorithms. Since Zaromb does not teach the method of this invention, the use of similar optical system components by Zaromb does not make this claim obvious. Therefore, Claim 3 is not rendered obvious by Zaromb in combination with other art related to change-detection algorithms.

Claims 6 and 7 are rejected for the same reasons as Claim 2 and because Zaromb teaches of detecting and mapping of mobile agents that are living organisms and a member of one of the taxonomic classes or mammalian (col. 6, lines 45-49). In col. 6 lines 45-49, Zaromb discusses using proteins and especially serum albumins as materials that have suitable fluorescent spectra to be useful as the fluorescent material in targets that are placed beyond the gas pollutants that he wants to detect. The fluorescence of the proteins serves as a source of light of different wavelengths that may be interacted with chemical gas pollutants to permit detection of the pollutants. Proteins are a class of molecules and are not living organisms. A living organism is a body made up of organs, organelles, and other parts that work together to carry on the various processes of life. Serum albumins are a particular category of protein that are found in the serum portion of blood. Since proteins in general and albumins in particular are not organisms and in particular are not mammals, Zaromb '908 does not teach the detecting and mapping of living organisms or more specifically of mammalian organisms and therefore does not render Claims 6 and 7 obvious.

Additionally, as presented above for Claim 2, we have shown that Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Therefore, it does not render Claim 1 obvious alone or in combination with other art. Since Claim 2 is rejected for the same reasons as Claim 1, Claim 2 also is not rendered obvious by Zaromb alone or in combination with other art. Since Claims 6 and 7 are rejected for the same reasons as

Claim 2, Claims 6 and 7 also are not rendered obvious by Zaromb alone or in combination with other art. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claims 6 and 7 to now be dependent on Claim 1, which Zaromb does not render obvious alone or in combination with other art related to change-detection algorithms. Therefore, Claims 6 and 7 are not rendered obvious by Zaromb in combination with other art related to change-detection algorithms.

Claim 8 is rejected for the same reasons as Claim 6 and 7 and because it would have been obvious to one of ordinary skill to include another member of the taxonomic order such as hymenoptera to the detection group in view of Zaromb's teaching of detection and mapping of mobile agents that are biological material and a member of one of the taxonomic classes.

As discussed in the preceding paragraphs regarding Claims 6 and 7, Zaromb discusses using proteins and especially serum albumins as a source of fluorescent light of different wavelengths that may be interacted with chemical gas pollutants to permit detection of the pollutants. Proteins are a class of molecules and are not living organisms. A living organism is a body made up of organs, organelles, and other parts that work together to carry on the various processes of life. Since proteins in general and albumins in particular are not organisms and are not members of the taxonomic order hymenoptera, Zaromb '908 does not teach the detecting and mapping of living organisms or more specifically of hymenoptera and therefore does not render Claim 8 obvious.

Claim 9 is rejected for the same reasons as Claim 2 and because Zaromb teaches of detecting and mapping of mobile agents that are non-living (col. 6, lines 49-57).

In col. 6, lines 49-57, Zaromb teaches the detection of nitrogen dioxide (a chemical pollutant) and lists a number of organic molecules that can be used as sources of fluorescent light that can be absorbed by nitrogen dioxide to enable its detection by the method of Zaromb. The organic molecules are incorporated as a part of a target material that is places behind the area where the chemical pollutants that

Zaromb seeks to detect are located. These organic molecules are not mobile agents in accordance with this present invention. In paragraph 14 of this present invention of Schmitt et al., the mobile agents whose movements are characterized using embodiments of this invention are described as living organisms or non-living, man-made units, not chemical gas pollutants. Since Zaromb is not teaching the detecting and mapping of mobile agents that are non-living, it does not render Claim 9 obvious.

Claim 12 is rejected for the same reasons as Claim 2 and because Zaromb teaches that the mobile agent emits interacted light at a wavelength different from the wavelength of transmitted light (col. 5, lines 62-67).

In col. 5, lines 62-67, Zaromb teaches the detection of several air pollutants using Raman backscattering and.or fluorescence. As presented above in the discussion of Claims 6, 7, and 9, air pollutants are not mobile agents. As presented above for Claim 2, we have shown that Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Therefore, it does not render Claim 1 obvious alone or in combination with other art. Since Claim 2 is rejected for the same reasons as Claim 1, Claim 2 also is not rendered obvious by Zaromb alone or in combination with other art. Since Claim 12 is rejected for the same reasons as Claim 2, Claim 12 also is not rendered obvious by Zaromb alone or in combination with other art. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claim 12 to now be dependent on Claim 1, which Zaromb does not render obvious alone or in combination with other art related to change-detection algorithms. Therefore, Claim 12 is not rendered obvious by Zaromb in combination with other art related to change-detection algorithms.

Claim 13 is rejected for the same reasons as Claim 2 and because Zaromb teaches that a material adherent, such as a dye, to the mobile agent emits interacted light at a wavelength different from the wavelength of transmitted light (col. 6 lines 6-9).

The dyes of col. 6, lines 6-9 of Zaromb are used a light sources to provide light of different wavelengths for the chemical pollutants to absorb (the use of the dyes is explained in Zaromb col. 6, lintes 10-66). They are not dye molecules that are adherent to a mobile agent. As presented above for Claim 2, we have shown that Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Therefore, it does not render Claim 1 obvious alone or in combination with other art. Since Claim 2 is rejected for the same reasons as Claim 1, Claim 2 also is not rendered obvious by Zaromb alone or in combination with other art. Since Claim 13 is rejected for the same reasons as Claim 2, Claim 13 also is not rendered obvious by Zaromb alone or in combination with other art. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claim 13 to now be dependent on Claim 1, which Zaromb does not render obvious alone or in combination with other art related to change-detection algorithms. Therefore, Claim 13 is not rendered obvious by Zaromb in combination with other art related to change-detection algorithms.

Claims 4 and 5 are rejected under 35 U.S.C. §103(a) as being unpatentable over Zaromb ('908) in view of Ulich (US Pat No. 4,862,257).

Claims 4 and 5 are rejected for the same reasons as Claim 2, which is rejected for the same reasons as Claim 1. As described above relating to Claim 1, Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. Ulich teaches the use of a gated camera and lens system to provide an image. Therefore, since Zaromb does not teach key aspects of this invention, the addition of the image system of Ulich to the teaching of Zaromb does not render Claims 4 and 5 obvious. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claims 4 and 5 to now be dependent on Claim 1, which Zaromb does not render obvious. Therefore, Claims 4 and 5 are not rendered obvious by Zaromb in combination with Ulich

Claim 10 is rejected as being unpatentable over Zaromb ('908) in view of Ramstack (US Pat No. 6,396,577).

Claim 10 is rejected for the same reasons as Claim 2, which is rejected for the same reasons as Claim 1. As described above relating to Claim1, Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents. In col. 2, lines 35-27, Ramstack teaches the use of elastic scattering to measure aerosol particles in clouds; it does not teach the detection of mobile agents since aerosol particles are not mobile agents as defined in the specification of this present invention. Therefore, since Zaromb does not teach key aspects of this invention, the addition of the teaching of Ramstack to the teaching of Zaromb does not render Claim 10 obvious. While Claim 2 is not rendered obvious by Zaromb, the applicant is choosing to cancel Claim 2 and make Claim 10 to now be dependent on Claim 1, which Zaromb does not render obvious. Therefore, Claim 10 is not rendered obvious by Zaromb in combination with Ramstack.

III. DISCUSSION: OBJECTION TO CLAIMS

The Office states that **Claims 11, 14-21** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, or if the rejection to its parent claim can be overcome.

As shown in the preceding discussion of the rejection of Claim 1, since Zaromb '908 does not teach the time-dependent detection of interacted light, the detection of mobile agents, or the mapping of the location of the mobile agents using the time dependence of the interacted light returning from the mobile agents, it does not render Claim 1 obvious alone or in combination with other art. Claim 1 is, therefore, not rendered unpatentable under 35 U.S.C. §103(a). Since Claim 1 should be allowed, Claims 11 and 14-21 are also allowable.

Claim 17 is objected to because if a collimated light beam is selected according to its parent claim, Claim 2, then it contradicts with the un-collimated light beam of Claim 17.

Claim 17 has been amended to depend on Claim 1.

Claims 18-21 are objected to because they are dependent on an objected parent claim, Claim 17.

Claim 17 has been amended to depend on Claim 1 and is allowable.

Conclusion

Applicants have responded to each and every objection and rejection, and urge that Claims **1-21** as presented are now in condition for allowance. Applicants request expeditious processing to issuance.

Respectfully submitted,

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